

California Education and the Environment Initiative

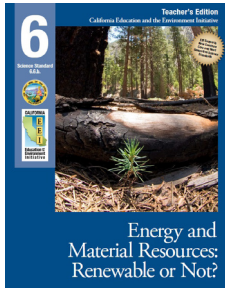
The EEI Curriculum cohesively integrates science and engineering practices (SEPs), content (disciplinary core ideas/DCIs), and crosscutting concepts (CCs) within its lesson procedures. This preliminary analysis intentionally teases apart the individual SEPs, DCIs, and CCs as a means of correlating the EEI unit with specific performance expectations; however, the EEI lessons weave these components back together.



Middle School (Grades 7 and 8 in the Integrated Course Model)

6.6.b. - Energy and Material Resources: Renewable or Not?

“Energy and Material Resources: Renewable or Not?” engages students in a study of Earth’s natural resources and the importance of these resources to the survival of Californians. They learn a simple categorization of resources as either material resources or energy resources and, through the course of the unit, begin to recognize which of these resources are essential to human life. The unit offers multiple examples of each type of natural resource, and illustrates how human practices and rates of consumption affect the availability of these resources. The students learn to use an analytical tool, a decision flowchart, to explore some of the benefits of alternative choices and the outcomes that could result from changing human practices and consumption rates through, for example, conservation efforts. As part of this analysis, they discover how increases in human population and per capita consumption of natural resources influence Earth’s natural systems. Finally, they consider if and how human practices can influence the long-term availability and quality of different natural resources.



Correlation Chart Key

SEP (Science and Engineering Practices)
DCI (Disciplinary Core Ideas)
CC (Crosscutting Concepts)

Next Generation Science Standards\* Correlation with the California Education and the Environment Initiative (EEI) Curriculum

The EEI Curriculum is a great choice for transitioning to NGSS and contributes toward achievement of the performance expectations for the disciplinary core ideas reflected in the Summary Chart below: MS-LS2 Ecosystems: Interactions, Energy, and Dynamics and MS-ESS3 Earth and Human Activity. Each EEI unit highlights a small number of performance expectations, science and engineering practices, disciplinary core ideas, and crosscutting concepts. Therefore, the EEI units contribute to students’ overall achievement of the performance expectations by the end of a school year, where they will have had multiple opportunities to engage in all appropriate science and engineering practices, disciplinary core ideas, and crosscutting concepts. While EEI was designed to teach the 1998 California science standards to mastery, it reflects the real world interconnections in science and already incorporates many of the paradigm shifts reflected in the NGSS. To learn more about how EEI supports NGSS, visit <http://californiaeei.org/NGSSGuides/>.

	Next Generation Science Standards					
	MS-LS2			MS-ESS3		
California Connection		✓	✓		✓	✓
Lesson 1 – Examine the resources natural systems provide, including energy resources found in California.	✓	✓	✓	✓	✓	
Lesson 2 – Categorize energy and material resources based on what is essential to human survival.		✓			✓	
Lesson 3 – Evaluate and discuss differences between renewable resources, nonrenewable resources, and inexhaustible resources.	✓	✓	✓	✓	✓	✓
Lesson 4 – Discuss how consumption rates and human practices affect the availability of fish for human use.	✓	✓	✓	✓	✓	✓
Lesson 5 – Analyze how human practices can affect the availability of various resources.					✓	✓
Traditional Unit Assessment				✓	✓	✓
Alternative Unit Assessment	✓	✓		✓	✓	✓
	SEP	DCI	CC	SEP	DCI	CC

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<b>Disciplinary Core Ideas Supported by this EEI Unit</b> <b>MS-LS2 Ecosystems: Interactions, Energy, and Dynamics</b> <b>MS-ESS3 Earth and Human Activity</b>					
Performance Expectations			Suggestions for Using the EEI Unit to Support NGSS		
<b>MS-LS2-4:</b> <i>(Grade 7 in the Integrated Course Model)</i> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.			Use this unit to have students examine how the changes humans have made to marine ecosystems as a result of overharvesting has affected those ecosystems, directly and indirectly, by diminishing the populations of overharvested species.		
<b>MS-LS2-5:</b> <i>(Grade 7 in the Integrated Course Model)</i> Evaluate competing design solutions for maintaining biodiversity and ecosystem services.			Use this unit to engage students in analyzing the choices humans make as they use resources and the consequences of those choices on natural systems. Have students evaluate how design solutions intended to help meet human demands should take into account the influence of alternative design solutions on biodiversity and the future availability of those resources.		
<b>MS-ESS3-1:</b> <i>(Grade 7 in the Integrated Course Model)</i> Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.			Use this unit to have students recognize that many resources are non-renewable and that their availability is permanently decreased as humans extract them from Earth. Have students identify how past geologic processes have influenced the global distribution of Earth’s natural resources (petroleum, minerals, and soil).		
<b>MS-ESS3-4:</b> <i>(Grade 8 in the Integrated Course Model)</i> Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.			Use this unit to have students realize that as the human population increases, the demand for natural resources increases. Have them consider how knowledge of the global status/availability of resources (renewable, non-renewable, or inexhaustible) is important when making decisions about how to consume and manage energy and other natural resources. Have students identify the effects of those decisions and the per capita consumption of natural resources on natural systems.		
Science and Engineering Practices (SEPs)	Suggestions for Using EEI to Support SEPs	Disciplinary Core Ideas (DCIs)	Suggestions for Using EEI to Support DCIs	Crosscutting Concepts (CCs)	Suggestions for Using EEI to Support CCs
<b>Engaging in Argument from Evidence (MS-LS2-4, MS-LS2-5, MS-ESS3-4)</b>	Use the unit to have students gather evidence with which they can argue that some of the energy resources used by humans are finite and can be exhausted, while the management of other resources can make them renewable (Lessons 1 and 3). Have students examine scenarios and determine the “pros” and “cons” of energy decisions and decide a best course of action based on cost, resource type, human needs, and effects on natural systems (Lessons 3 and 4).	<b>LS2.C: Ecosystem Dynamics, Functioning, and Resilience:</b> -Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) - Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5)	Use the unit to have students identify the influences that humans have had, and continue to have, on the functioning of natural systems (Lessons 1 and 2). Have them explain how the choices humans make can mitigate negative impacts on resource use and resource extraction, thereby increasing the likelihood that natural systems will recover and continue to provide ecosystem goods and services (Lessons 3 and 4).	<b>Stability and Change (MS-LS2-4, MS-LS2-5)</b>	Use the unit to have students describe how some disturbances to natural systems rapidly influence their stability, such as with species depletion due to overfishing, while others occur gradually, such as the distribution of natural resources (Lessons 1 and 4). Have students identify that small changes to an entire species, such as the effects of logging on a particular tree species, can result in large changes to other species, such as salmon reproduction due to soil erosion (Lessons 3 and 4).

Science and Engineering Practices (SEPs)	Suggestions for Using EEI to Support SEPs	Disciplinary Core Ideas (DCIs)	Suggestions for Using EEI to Support DCIs	Crosscutting Concepts (CCs)	Suggestions for Using EEI to Support CCs
<b>Constructing Explanations and Designing Solutions (MS-ESS3-1)</b>	Use the unit to have students explain the differences between energy resources and energy materials (Lessons 1 and 2). Have them analyze the positive and negative effects of aquaculture in California (Lessons 1 and 4). Have students analyze and describe the differences between renewable, nonrenewable, and inexhaustible energy (Lessons 3, 4, and 5). Have them design solutions related to their own energy use decisions and explain how those decisions can influence the rate of human resource consumption and the resulting effects on Earth’s natural systems (Lessons 3, 4, and 5).	<b>LS4.D: Biodiversity and Humans:</b> Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on – for example, water purification and recycling. (secondary to MS-LS2-5)	Use the unit to have students examine the history of food and fuel use in California and describe how it affects the biodiversity of ocean ecosystems (Lesson 1). Have them review the history of aquaculture and its impact on species health, economic growth, and biodiversity (Lessons 1 and 4). Have students identify different decisions humans have made regarding the use of natural resources and explain how those choices affect biodiversity (Lessons 3 and 4).	<b>Cause and Effect (MS-ESS3-1, MS-ESS3-4)</b>	Use the unit to have students describe how scientists use the cause and effect relationships identified through scientific investigations as the basis for predicting the effects of future human activities on natural systems, such as the influence of logging on biodiversity (Lessons 3, 4, and 5).
		<b>ESS3.A: Natural Resources:</b> Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)	Use the unit to have students examine specific energy and material resources and how they are used by humans as either food or fuel (Lessons 1, 2, and 3). Have them analyze the impacts the use and extraction of these resources has on Earth’s systems (Lessons 3 and 4). Have students explain that some resources are limited and not replaceable over a human lifetime, have uneven distribution on Earth, and therefore the consumption and use of those resources must be managed to assure their availability for future generations (Lessons 1 and 5).	<b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Science, Engineering, and Technology on Society and the Natural World (MS-ESS3-1)</b>  <b>Connections to Nature of Science</b> <b>Science Addresses Questions About the Natural and Material World (MS-LS2-5)</b>	Use the unit to have students evaluate the impacts newer technologies and designed solutions can have on natural resource extraction, resource use, and the environmental challenges that result from human activities (Lessons 1-5).   Use this unit to have students recognize that science helps explain the consequences human activities have had on Earth’s natural systems, but that is up to individuals, communities, and societies to use this information as the basis for making decisions about their future actions (Lessons 1-5).

Science and Engineering Practices (SEPs)	Suggestions for Using EEI to Support (SEPs)	Disciplinary Core Ideas (DCIs)	Suggestions for Using EEI to Support DCIs	Crosscutting Concepts (CCs)	Suggestions for Using EEI to Support CCs
		<b>ESS3.C: Human Impacts on Earth Systems:</b> Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-4)	Use the unit to have students recognize that the scope and scale of some human activities can have significant long-term effects on natural systems, such as with sardine and tuna harvesting off the California coast (Lesson 1). Have them identify how some of the technologies and methods used to obtain natural resources have had significant negative effects, and describe how newer technologies and different choices may help mitigate the negative impacts on Earth's natural systems and resources (Lessons 3, 4, and 5).		